

SAND2021-XXXXX R



Final CTAP Report
National Technology & Engineering Solutions of Sandia, LLC
 Out of State Visitor Mobility Analysis
 with New Mexico Department of Health

STATEMENT OF WORK

Sandia will provide technical assistance to New Mexico Department of Health to provide analysis of SafeGraph mobility data (for which Sandia already has the data and a Data Use Agreement in place with the data provider). Sandia will produce analysis to determine the contribution of travel to SARS-CoV-2 spread within New Mexico.

The objective of this project is to provide situational awareness to NMDOH about mobility patterns around the state, specifically related to the numbers and destinations of out of state visitors and in state long distance travel. This will improve understanding of the mechanisms of SARS-CoV-2 spread into and around the state, enabling NMDOH to assess the efficacy of public health measures that are in place.

Specifically, this project will include the following activities:

- Time trend analysis of location and volume of out-of-state traffic
- Time trend analysis of location and volume of in-state long distance travel
- Correlation between travel corridors and recent case trends
- Analysis of interaction patterns at different locations (e.g., dwell times)

The analysis will be updated as needed on a ~2 week basis as real time data is available.

Methodology

SafeGraph mobility data includes information about foot traffic at over 5 million places of interest (POI) across the US based on cell phone records. The POIs in the database include individual schools, hospitals, parks, grocery stores, and restaurants, etc. SafeGraph assigns each cell phone record to a home census block group (CBG) by analyzing 6 weeks of data during nighttime hours. CBG is the highest resolution for census demographic information and generally contains between 600 to 3,000 people. Census data is used to assign demographic information to each CBG, including median household size and median household income, which is also used in the analysis. The data is anonymized by SafeGraph such that individual people cannot be identified. North American Industry Classification System (NAICS) codes are used to classify each POI based on business type. In this analysis, the area of each POI is used to normalize the foot traffic at each location. This data is coupled with case count data on a county level provided by the New York Times. The data that we used in this analysis includes the following information:

- Number of visitors that arrive at a POI an hourly basis
- Distribution of dwell times at each POI

EXHIBIT 2 COMPLAINT

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- Area of each POI
- Home CBG for visitors
- Number of devices that are at home on an hourly basis for each CBG
- Population per CBG
- Median household income by CBG
- Median household size by CBG
- 6-digit NAICS code of each POI
- Case count rate per county

We use this information to extract several metrics related to long distance travel and extract interactions that people have at POIs and at home. Interactions are defined by the amount of time people spend at the same place at the same time. These metrics can be grouped by county, demographics, and by NAICS code. Interactive graphics are created to visualize how these metrics change over time on a county by county basis. Furthermore, metrics are used in correlation analysis to see if interactions are a strong leading or lagging indicator of changes in case rates.

Summary of Results

The analysis identifies out-of-state visitors (or visitors that traveled over a distance threshold) to a POI within NM and identified which types of businesses they are frequenting. Furthermore, the analysis identifies if people are coming from areas with higher daily case rates. For example, results from early November show the potential of high out-of-state travel impacts in south-central NM, focused at gas stations, retail, and food service establishments. Overall, interactions at restaurants were consistently high across the state over the entire period of analysis. Correlation between interaction and case rates per county were low, even with a range of lead and lag time. Given that transmission of COVID-19 is largely attributed to direct or close contact, this suggests that the mobility data fails to capture important interactions that are driving the spread of COVID-19. For example, the dataset does not include POIs that are known to be involved in outbreaks such as meat packing plants and the data does not include adequate detail about time spent with others in neighborhoods. Nevertheless, the analysis captures important changes in mobility across the state as policy measures were put in place and allows policy makers to see interactions at different business types as a function of POI size and customer demographics. More detailed device level mobility data could be used in future analysis.

Changes to the SOW

None

DELIVERABLES/OUTCOMES

Ongoing analysis results were delivered approximately monthly between November 2020 and February 2021. Categories of analysis include: (1) social distancing behavior by household size and income, (2) correlation between mobility and COVID-19 cases, (3) occupancy and contact density trends within New

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Mexico, and (4) occupancy by NAICS codes. Interactive mobility graphics were prepared for NMDOH to fully assess SafeGraph mobility data within New Mexico.

COSTS

This project was projected to cost

Category	Projected Cost	Final Cost
Labor	\$10,000.00	\$9,999.50
Mileage		\$0.00
Total	\$10,000.00	\$9,999.50

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